

In the Claims

Please replace all prior versions, and listings, of claims in the application with the following list of claims:

1. (Currently Amended) A semiconductor material comprising:
a silicon substrate;
a ~~compositionally graded~~ transition layer formed over the silicon substrate, the transition layer including a back surface and a front surface, wherein the transition layer comprises a nitride alloy and a gallium concentration in the transition layer increases from a back surface to a front surface; and
a single crystal gallium nitride material region comprising at least one gallium nitride material layer formed over the transition layer, the region having a thickness of greater than 0.5 microns and a crack level of less than 0.005 $\mu\text{m}/\mu\text{m}^2$.
- 2-3. (Cancelled)
4. (Currently Amended) The semiconductor material of claim 1, wherein the transition layer comprises an alloy of gallium nitride selected from the group consisting of $\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{N}$, $\text{In}_y\text{Ga}_{(1-y)}\text{N}$, and $\text{Al}_x\text{Ga}_{(1-x)}\text{N}$, wherein $0 \leq x \leq 1$ and $0 \leq y \leq 1$.
- 5-6. (Cancelled)
7. (Currently Amended) The semiconductor material of claim ~~6~~ 4, wherein the sum of the value of x and the value of y at the ~~back~~ front surface is ~~greater~~ less than ~~0.4~~ 0.2.
8. (Currently Amended) The semiconductor material of claim ~~6~~ 4, wherein the sum of the value of x and the value of y at the back surface is greater than 0.8.
9. (Currently Amended) The semiconductor material of claim ~~6~~ 1, wherein the transition layer comprises $\text{Al}_x\text{In}_{(1-x)}\text{N}$ at the back surface of the transition layer in contact with the silicon substrate, wherein $0 \leq x \leq 1$.

10. (Currently Amended) The semiconductor material of claim 6 ~~4~~, wherein the sum of the value of x and the value of y at the front surface is less than 0.3.
11. (Currently Amended) The semiconductor material of claim 6 ~~4~~, wherein the transition layer comprises GaN at a front surface of the transition layer ~~in contact with the gallium nitride material layer~~ and is free of gallium at a back surface of the transition layer ~~in contact with the substrate~~.
12. (Currently Amended) The semiconductor material of claim 4, wherein the transition layer comprises $\text{Al}_x\text{Ga}_{(1-x)}\text{N}$, wherein $0 \leq x \leq 1$ and $0 \leq y \leq 1$.
13. (Original) The semiconductor material of claim 4, wherein the value of x decreases in a direction away from the silicon substrate.
14. (Original) The semiconductor material of claim 4, wherein the value of y remains constant across the transition layer.
- 15-17. (Cancelled)
18. (Original) The semiconductor material of claim 1, wherein the transition layer has a thickness between about 0.03 micron and about 20 microns.
19. (Original) The semiconductor material of claim 1, wherein the gallium nitride material layer comprises GaN.
20. (Currently Amended) The semiconductor material of claim 1, wherein the gallium nitride material layer comprises $\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{N}$, wherein $0 \leq x \leq 1$ and $0 \leq y \leq 1$.
21. (Currently Amended) The semiconductor material of claim 1, wherein the gallium nitride material layer region has a thickness of greater than 0.75 micron.

22. (Original) The semiconductor material of claim 1, wherein the semiconductor material forms a semiconductor device.
23. (Original) The semiconductor material of claim 22, wherein the semiconductor material forms an LED.
24. (Original) The semiconductor material of claim 22, wherein the semiconductor material forms a laser diode.
25. (Original) The semiconductor material of claim 22, wherein the semiconductor material forms a FET.
26. (Currently Amended) The semiconductor material of claim 1, wherein the gallium nitride material ~~layer~~ region has a crack level of less than $0.005 \mu\text{m}/\mu\text{m}^2$.
27. (Currently Amended) The semiconductor material of claim 1, wherein the gallium nitride material ~~layer~~ region has a crack level of less than $0.001 \mu\text{m}/\mu\text{m}^2$.
28. (Original) The semiconductor material of claim 1, wherein the gallium nitride material ~~layer~~ region is substantially free of cracks.
29. (Canceled)
30. (Original) The semiconductor material of claim 1, wherein the silicon substrate has a thickness of greater than 250 micron.
31. (Original) The semiconductor material of claim 1, wherein the silicon substrate is textured.
32. (Original) The semiconductor material of claim 1, further comprising an intermediate layer formed over the silicon substrate and under the transition layer.

33. (Currently Amended) The semiconductor material of claim 1 ~~+~~ 32, wherein the intermediate layer has a constant composition.
34. (Currently Amended) The semiconductor material of claim 1 ~~+~~ 32, wherein the intermediate layer comprises an alloy of gallium nitride ~~selected from the group consisting of $\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{N}$, $\text{In}_y\text{Ga}_{(1-y)}\text{N}$, and $\text{Al}_x\text{Ga}_{(1-x)}\text{N}$.~~
35. (Original) The semiconductor material of claim 1, wherein the silicon substrate comprises a silicon wafer.
- 36-85. (Canceled)
86. (Currently Amended) A semiconductor material comprising:
a silicon substrate having a diameter of at least about 4 inches;
a transition layer formed over the silicon substrate; and
a single crystal gallium nitride material region comprising at least one gallium nitride material layer formed over the transition layer, the region having a thickness of greater than 0.5 microns and a crack level of less than $0.005 \mu\text{m}/\mu\text{m}^2$.
87. (New) The semiconductor material of claim 1, wherein the gallium concentration in the transition layer increases discontinuously from the back surface to the front surface.
88. (New) The semiconductor material of claim 1, wherein a thickness of the transition layer is defined between the back surface and the front surface, the gallium concentration in the transition layer increasing, or staying constant, across the entire thickness.
89. (New) The semiconductor material of claim 1, wherein the transition layer is free of gallium at the back surface

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89. (New) The semiconductor material of claim 32, wherein the intermediate layer is free of gallium.